PATENT SPECIFICATION 807,863

Inventor :—WILLIAM JOHN GLYDON JONES.

Date of filing Complete Specification : March 21, 1957.

Application Date : Dec. 22, 1955. No. 36831/55.

Complete Specification Published : Jan. 21, 1959.

Index at Acceptance :—**Classes 28(2), Q ; and 87(2), A1G(2 : 7AX : 12).**

International Classification :—A22c. B30c.

COMPLETE SPECIFICATION.

Improvements in or relating to the Manufacture of Food Products.

We, T. WALL & SONS LIMITED, a Company registered under the laws of Great Britain, of The Friary, Acton, London, W.3, England, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement :—

This invention relates to the manufacture of food products.

According to the present invention a seamless casing is extruded on to an extruded food material substantially at the same time as the food material is shaped into the required form by extrusion.

The present invention provides, therefore, a process for making an extruded food product which comprises extruding, substantially simultaneously, food material and a solution of a casing-forming substance into a precipitating bath for the casing-forming substance, so as to form a seamless casing on the extruded food material.

Preferably, the casing is formed from material and by a process such that the casing is edible.

Preferably, the food material contains or consists of finely comminuted meat. A particularly preferred food material is sausage meat, the method being particularly applicable to the formation of an extruded sausage product.

The method of operation is to form the casing by extruding a solution of a suitable substance into a precipitating bath. Such material may be a suitably viscous solution of a polyuronide, such as a polygalacturonate, for instance an alginate or a pectate, or a protein solution of the kind known in the textile field as a "spinning solution." Using an annular extrusion orifice to extrude the casing-forming material, which orifice concentrically surrounds the extrusion orifice for the food material, both orifices either being immersed in the precipitating bath or situated a short distance from the precipitating bath, the casing is extruded on to the freshly extruded food material at a short distance from the extrusion device. Extrusion must be in a substantially vertical direction, either upwards or downwards.

In the preferred method of practising the invention, the casing is formed by extruding the suitably viscous aqueous solution of a water-soluble alginate into a precipitating bath.

A preferred starting material for the casing in accordance with the invention is water-soluble sodium alginate, such as is, for example, used as a thickening agent for jam. It is preferable to use an alginate which has been decomposed as little as possible, that is which possesses a high viscosity, as this has a very high degree of polymerisation, and the casings prepared therefrom possess an especially high strength.

Artificial casings for use in accordance with the invention can be manufactured by dissolving sodium alginate in water to form a viscous solution which preferably contains about 4 to 6% of sodium alginate. Additives, such as fat emulsions or cellulosic compounds, may be added to the starting solution to improve the properities of the casing, but such additives must be brought into solution and, if necessary, alkali is added to the starting solution for this purpose.

After the prepared starting solution has been filtered and freed from the air bubbles contained therein by being allowed to stand or by being evacuated, the solution is extruded through an annular nozzle into a precipitating bath which may consist of a 10 to

[*Price 3s. 6d.*]

15% weakly acid calcium solution. The tube formed from the solution by means of the nozzle is subjected to a coagulation on entering the bath and is solidified into a casing on its passage through the bath. Calcium acetate may be preferably as the precipitating agent and up to 20% may be used.

The invention further includes apparatus for carrying out processes according to the invention. Suitable apparatus for making an extruded food product comprises an annular outer extrusion orifice for the solution of the casing-forming substance which concentrically surrounds an annular inner extrusion orifice for the food material, means for supplying the solution of the casing-forming substance to the outer extrusion orifice, means for supplying food material to the inner extrusion orifice and means for controlling the flow of the solution of the casing-forming substance. In particular, means for controlling the size of the outer orifice is preferably incorporated.

Though the preferred cross-section is circular, it may be desirable for special purposes to use rectangular or other shapes, and the reference to the concentric disposition is not meant to exclude shapes which are not circular.

The invention will further be illustrated with reference to the drawing accompanying the Provisional Specification which represents a vertical section of a suitable extrusion device for upward extrusion. The illustration is in terms of the extrusion of an alginate solution on to sausage meat but is not to be considered as limiting the invention.

The device consists of disc-shaped members 1 and 2 and annular member 3 held together so as to provide a cavity 4 by means of bolts (not shown). Two gaskets 5 and 6 are interposed between members 1 and 3 and 2 and 3 respectively. The disc-shaped member 2 has two hollow bosses 7 and 8, respectively adapted to be attached to a sausage meat delivery line (not shown) and an alginate solution delivery line (not shown). The disc-shaped member 1 is provided with a tubular extension 9 which is provided with external threads 10 to enable it to be screwed into a vessel (not shown) for the precipitating solution. A pipe 11 of uniform internal cross-section corresponding to the cross-section of the shaped sausage meat is screwed into and ends at the hollow boss 7 and is locked in position by locking nut 12. The pipe 11 extends throughout the length of the tube 9 and the other end of pipe 11 serves as the sausage meat extrusion orifice. The bore of pipe 11 is slightly chamfered or radiussed at the extrusion end. The tube 9 has a greater internal cross-section than the external cross-section of the pipe 11 so that there is an annular space 13 between them. The wall of the pipe 11 at its extrusion end is shaped externally like a truncated cone and co-operates with the wall of the tube 9 to narrow the annular space. This narrowed space 14 serves as the extrusion orifice for the alginate solution. Its dimension and, hence, the thickness of the resultant casing can be varied by loosening the locking nut 12 and turning the pipe 11, thereby axially displacing it in relation to the tube 9. Three screws 15*a*, 15*b* and (not shown) 15*c* are provided to centralise the pipe 11 relative to the tube 9. The annular space 13 communicates with the cavity 4 which, in turn, communicates with the hollow boss 8. A filter plate 16, having a filter gauze 17 whose apertures are about 75 microns in diameter secured to it, is fitted across the cavity 4 so that an alginate solution passing from the hollow boss 8, through the cavity 4 into the annular space 13 has to pass through the filter gauze 17 and plate 16.

By way of example, the following mode of operation may be adopted to manufacture sausages according to the invention. The device was screwed into the bottom of an open vessel so that the extrusion orifice protruded into the vessel. The vessel was provided with an inlet and an outlet so that it might be filled with a precipitating solution or emptied. At the start of the operation the vessel was empty. A sausage meat delivery line was attached to the boss 7. An alginate solution delivery line, connected through a gear pump to a tank containing deaerated 4% sodium alginate solution was attached to the boss 8. The temperature of the solution was 20—25° C. and its viscosity about 300 poises at 18° C. The diameter of the sausage meat extrusion orifice was 15.5 mm. and the width of the alginate extrusion orifice 0.15 mm.

The delivery of alginate solution to the extrusion device was begun first. As soon as alginate extrusion took place the delivery of sausage meat was begun. Both alginate solution and sausage meat were extruded at a speed of about 12 cm/sec. It is desirable that the alginate adhere to the sausage meat as near the orifice as possible. A precipitating solution consisting of an aqueous 17% solution of calcium acetate at 16° C. was run into the vessel as soon as sausage meat was being extruded. The coated sausage formed near the extrusion device was guided to the top of the vessel and into an adjoining vessel which was filled with 17% calcium acetate solution at 16° C. Extrusion proceeded continuously to form a continuous length of sausage. The sausage traversed the coagulating bath in 3 to 4 seconds and was guided round two spaced driven rollers, both immersed in the second bath, so as to traverse this bath several times and to emerge from it finally after about 3½ minutes,

then to be washed free of surplus calcium acetate by running water. The continuous length of sausage was now ready to be twisted into links, sub-divided or stored.

A somewhat similar procedure may, for instance, be used with protein as the casing-forming material. The aqueous "spinning solution" was prepared by the method described in Specification No. 757,215 and contained 22.22% by weight of groundnut protein and 1.33% by weight sodium hydroxide. The solution was passed to the extrusion orifice through a pipe line of such dimension that 10 minutes elapsed between formation of the solution and is extrusion. The solution was extruded at the rate of 50 ml/min., the sausage meat, in this case, being extruded at the rate of 3 m/min. The precipitating bath consisted of an aqueous solution at 25 to 28° C. containing 2.5% sulphuric acid, 20% sodium chloride and 0.5% formaldehyde. The second bath consisted of an aqueous 22% sodium sulphate solution at 30° C. and the continuous length of sausage emerged from this bath after 1½ minutes. The continuous length of sausage was then passed into a third bath consisting of an aqueous solution at 80° C. containing 22% sodium sulphate, 3% formaldehyde and enough sodium hydroxide to adjust the pH of the solution to 10.5. Treatment in this bath lasted for 3 minutes. Running water was used, as in the case of alginate to remove adhering reagents from the continuous length of sausage.

WHAT WE CLAIM IS:—

1. A process for making an extruded food product which comprises extruding, substantially simultaneously, food material and a solution of a casing-forming substance into a precipitating bath for the casing-forming substance so as to form a seamless casing on the extruded food material.

2. A process according to Claim 1 in which the food product is a sausage product and in which the food material is sausage-meat.

3. A process according to Claim 1 or Claim 2 in which the casing-forming substance is an alginate.

4. A process substantially as herein before described with reference to the drawing accompanying the Provisional Specification.

5. Apparatus for making an extruded food product which comprises an annular outer extrusion orifice for the solution of the casing-forming substance which concentrically surrounds an annular inner extrusion orifice for the food material, means for supplying the solution of the casing-forming substance to the outer extrusion orifice, means for supplying food material to the inner extrusion orifice and means for controlling the flow of the solution of the casing-forming substance.

6. Apparatus according to Claim 5 which comprises means for controlling the size of the outer orifice.

7. An extruded food product whenever prepared by a process according to any of claims 1 to 4, inclusive.

T. WALL & SONS LIMITED,
R. JONAS,
Agent for the Applicants.

PROVISIONAL SPECIFICATION.

Improvements in or relating to the Manufacture of Sausages.

We, T. WALL & SONS LIMITED, a Company registered under the laws of Great Britain, of The Friary, Acton, London, W.3, England, do hereby declare this invention to be described in the following statement:—

This invention relates to the manufacture of sausages.

According to the invention a seamless casing is extruded on to sausage meat substantially at the same time or soon after the sausage meat is shaped into the required form by extrusion.

Preferably the casing is formed from material and by a process such that the casing is edible.

One method of operating is to form the casing by extruding suitable material into a precipitating bath. Such material may be a suitably viscous solution of a polyuronide such as a polygalacturonate, for instance an alginate or pectate, or a protein solution of the kind known in the textile field as "spinning solutions." Using an annular extrusion orifice for the casing forming material which orifice concentrically surrounds the extrusion orifice for the sausage meat, both orifices being immersed in the precipitating bath, the material coats the freshly extruded sausage meat a little distance from the extrusion device. Extrusion is preferably in a vertical direction, upwards or downwards.

In the preferred method of practising the invention the casing is formed by extruding a suitably viscous aqueous solution of a water-soluble alginate into a precipitating-bath, as described, for instance, on page 1, lines 82—88, and page 2, lines 1—36, of British

Patent Specification No. 711,437, but calcium acetate may be preferable as the precipitating agent and up to 20% may be used.

The invention will be further illustrated with reference to the accompanying drawing which represents a vertical section of a suitable extrusion device for upward extrusion.

The device consists of disc-shaped members 1 and 2 and annular member 3 held together so as to provide a cavity 4 by means of bolts (not shown). Two gaskets 5 and 6 are interposed between members 1 and 3 and 2 and 3 respectively. The disc-shaped member 2 has two hollow bosses 7 and 8, respectively adapted to be attached to a sausage meat delivery line (not shown) and an alginate solution delivery line (not shown). The disc-shaped member 1 is provided with a tubular extension 9 which is provided with external threads 10 to enable it to be screwed into a vessel (not shown) for the precipitating solution. A pipe 11 of uniform internal cross-section corresponding to the cross-section of the shaped sausage meat is screwed into and ends at the hollow boss 7 and is locked in position by locking nut 12. The pipe 11 extends throughout the length of the tube 9 and the other end of pipe 11 serves as sausage meat extrusion orifice. The bore of pipe 11 is slightly chamfered or radiussed at the extrusion end. The tube 9 has a greater internal cross-section than the external cross-section of the pipe 11 so that there is an annular space 13 between them. The wall of the pipe 11 at its extrusion end is shaped externally like a truncated cone and co-operates with the wall of the tube 9 to narrow the annular space. This narrowed space 14 serves as the extrusion orifice for the alginate solution. Its dimension and, hence, the thickness of the resultant casing can be varied by loosening the locking nut 12 and turning the pipe 11 thereby axially displacing it in relation to the tube 9. Three screws 15a, 15b and (not shown) 15c are provided to centralise the pipe 11 relative to the tube 9. The annular space 13 communicates with the cavity 4 which, in turn, communicates with the hollow boss 8. A filter plate 16, having a filter gauze 17 whose apertures are about 75 microns in diameter secured to it, is fitted across the cavity 4 so that an alginate solution passing from the hollow boss 8, through the cavity 4 into the annular space 13 has to pass through the filter gauze 17 and plate 16.

By way of example, the following mode of operation may be adopted to manufacture sausages according to the invention. The device was screwed into the bottom of an open vessel so that the extrusion orifices protruded into the vessel. The vessel was provided with an inlet and an outlet so that it might be filled with a precipitating solution or emptied. At the start of the operation the vessel was empty. A sausage meat delivery line was attached to the boss 7. An alginate solution delivery line, connected through a gear pump to a tank containing deaerated 4% sodium alginate solution was attached to the boss 8. The temperature of the solution was 20—25° C. and its viscosity about 300 poises at 18° C. The diameter of the sausage meat extrusion orifice was 15.5 mm. and the width of the aliginate extrusion orifice 0.15 mm.

The delivery of alginate solution to the extrusion device was begun first. As soon as alginate extrusion took place the delivery of sausage meat was begun. Both alginate solution and sausage meat were extruded at a speed of about 12 cm/sec. A precipitating solution consisting of an aqueous 17% solution of calcium acetate at 16° C. was run into the vessel as soon as sausage meat was being extruded. The coated sausage formed near the extrusion device was guided to the top of the vessel and into an adjoining vessel which was filled with 17% calcium acetate solution at 16° C. Extrusion proceeded continuously to form a continuous length of sausage. The sausage traversed the coagulating bath in 3—4 seconds and was guided round two spaced driven rollers, both immersed in the second bath, so as to traverse this bath several times and to emerge from it finally after about 3½ minutes, then to be washed free of surplus calcium acetate by running water. The continuous length of sausage was now to be twisted into links, subdivided or stored.

A somewhat similar procedure may, for instance, be used with protein as the casing forming material. The aqueous "spinning solution" was prepared by the method described in co-pending Application No. 22,796/53 (Serial No. 757,215) and contained 22.22% by weight of groundnut protein and 1.33% by weight sodium hydroxide. The solution was passed to the extrusion orifice through a pipe line of such dimension that 16 minutes elapsed between formation of the solution and its extrusion. The solution was extruded at the rate of 50 ml/min., the sausage meat, in this case, being extruded at the rate of 3 m/min. The precipitating bath consisted of an aqueous solution at 25—28° C. containing 2.5% sulphuric acid, 20% sodium chloride and 0.5% formaldehyde. The second bath consisted of an aqueous 22% sodium sulphate solution at 30° C. and the continuous length of sausage emerged from this bath after 1½ minutes. The continuous length of sausage was then passed into a third bath consisting of an aqueous solution at 80° C. containing 22% sodium sulphate, 3% formaldehyde and enough sodium hydroxide to adjust the pH of the solution to 10.5. Treatment in this bath lasted for 3

minutes. Running water was used, as in the case of alginate to remove adhering reagents from the continuous length of sausage.

T. WALL & SONS LIMITED,
R. JONAS,
Agent for the Applicants.

Abingdon : Printed for Her Majesty's Stationery Office, by Burgess & Son (Abingdon), Ltd.—1958.
Published at The Patent Office, 25, Southampton Buildings, London, W.C.2,
from which copies may be obtained.

807,863 PROVISIONAL SPECIFICATION

1 SHEET

This drawing is a reproduction of the Original on a reduced scale.